

1287

PCT/IB00/01088

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE
in its capacity as elected Office

Date of mailing (day/month/year) 25 May 2001 (25.05.01)	
International application No. PCT/IB00/01088	Applicant's or agent's file reference PV/38720/PCT
International filing date (day/month/year) 03 August 2000 (03.08.00)	Priority date (day/month/year) 19 August 1999 (19.08.99)
Applicant NASCIMBENE, Andrea	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
16 March 2001 (16.03.01)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Juan Cruz Telephone No.: (41-22) 338.83.38
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ADD-ON RADIO REPEATER FOR TDMA POINT-MULTIPOINT RADIO COMMUNICATION SYSTEMS

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This invention relates to a new way of providing add-on repeater in TDMA point-multipoint radio systems, allocating the functions to already existing components of these systems.

PRIOR ART AND RELATED PROBLEMS

It is well known that, when dealing with connections between two radio devices working at high frequencies (> 10 GHz), a Line-Of-Sight (LOS) condition is needed between the two antennas. Unfortunately (especially within the urban environment) this condition might be difficult to be provided for all sites.

Problems may be even bigger with point-to-multipoint (PMP) systems, as the one represented in Fig. 1 of the annexed drawings by way of example, where a radio base station (RBS) of a network (N) is initially connected to a number of radio access terminals (RAT) in a specific area. When subsequently one wants to add as many new terminals (RAT) as needed to connect new users to the network, even when worked according to an accurate planning, situations may arise in which providing new connections could be impossible, since the possibility of providing a line of sight condition is not available (e.g. due to the presence of buildings or to the pattern of the land) or no longer available (e.g. because new buildings have been built), or because errors in the previous planning of covering the interested area have been done, or because the same area was not of interest.

In such a case - which is represented in Fig. 2 - an area which is not covered by the radio base station (RBS) is referred to as "shadowed area" (therefore, it is represented shadowed in figure) and radio access terminals (RAT) which are desired to be installed in such an area are referred to as shadowed radio access terminals (SRAT).

Up to now, two solutions to the above referenced problem have been considered and both of them are unsatisfactory:

- to over-provision the access network, so that areas with expected coverage problems are served by more than one RBS;
- to move the RBS to a different site.

The first solution involves, of course, higher costs per access point and it anyway does not guarantee that adding new radio access terminals (RAT) will be

possible (for instance due to the possibility of new buildings, not existing upon the planning of the coverage).

Also the second solution is unsatisfactory: in fact, to move the radio base station (RBS) to a different site is difficult, as all antennas have to be re-aligned and all of radio access terminals (RAT) have consequently to be put out of working before their relocation.

SUMMARY OF THE INVENTION

Therefore, the main object of this invention is to provide a more simple and effective solution to the above problems, by means of a so called "radio access terminal/add-on radio repeater" (RAT/AR) which ensures an easy and fast arrangement, while leaving the already existing arrangement unchanged.

The repeater functionality is of course not new: indeed it is very largely used in the world. Nevertheless, the new idea is to have an ordinary Radio Access Terminal (RAT) that might be used as a repeater with a very low effort and without impacting the existing access network, so as to be able to reach other terminals in "shadow areas".

More in depth, the invention refers to an add-on radio repeater (RAT/AR) for TDMA point-multipoint radio communication systems, characterised in that it consists of an ordinary radio access terminal (RAT), to which the functionality of a repeater is given upon request.

Suitably, the functionality of a repeater is given to the said ordinary radio access terminal pre-existing and pre-installed in the network by adding an external unit, which comprises a new antenna and suitable co-ordination means. Said external unit does not affect the radio access terminal (RAT) and can be removed in any time.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is now described more in detail in the following, with reference to the annexed drawings, wherein:

Fig. 1 schematically shows a conventional point-multipoint TDMA radio communication system, of the above referenced kind;

Fig. 2 schematically explains the problem of enlarging a conventional point-multipoint TDMA radio communication system, such as the one of Fig. 1, also to which reference has been made above; and

Fig. 3 schematically shows a point-multipoint TDMA radio communication system according to this invention, wherein an add-on repeater is used, which

consists of a radio access terminal (RAT) to which the functionality of a repeater is given.

The invention applies to TDMA access networks, namely to networks which are based on time division multiple access. With such a kind of network, the radio base station (RBS) continuously transmits in the direction from itself to radio access terminal (RAT) (downlink direction), while in the opposite direction (from RAT to RBS, uplink direction) radio access terminals (RAT) send information only when they are allowed to do that, based on a pre-defined algorithm or on an explicit permits. The Media Access Control function (MAC) inside RAT determines whether the terminal is allowed to transmit. Conversely, in FDMA and CDMA networks, all transmitters are, or may be, constantly on.

The add-on radio repeater RAT/AR according to the invention basically consists of an ordinary RAT 1 (Fig. 3) also comprising a modem 5. When the repeater functionality is needed, an external unit 2 with a new antenna 3 is added thereto together with appropriate combining or co-ordination functions 4. This unit may be later removed in case the repeater function of the terminal is not needed any more (for instance because new RBS have been installed, covering the shadow area). The other parts components of the RAT 1 are not affected for these modifications, thus minimising implementation and installation complexity and making it possible to reuse the terminal 1 as an ordinary one, whereas it is not required thereto to play the role of a repeater.

The add-on repeater (RAT/AR) behaves towards the RAT's in the Shadow Area (SRAT) as it if it were the RBS:

- in the downlink direction, the added-on transmitter continuously transmits the same information received from the RBS, without any change;
- in the uplink direction, data coming from SRAT are forwarded to the RBS, still without changes;
- since SRAT consider themselves as directly connected to the RBS, the ordinary TDMA access mode is used to prevent collision (algorithm or permit).

The approach used by this invention involves neither the possible modem 5, nor the MAC functions of the RAT 1 to which the repeater functionality has been added: the rest of the RAT/AR equipment of Fig. 3 simply acts as the terminal 1 did before. In other words, the repeater functionality is completely transparent to the equipment of the terminal 1 and especially to the MAC that has

not to manage any special protocol to allow RAT in the shadow area to communicate with the RBS.

The invention allows to achieve important improvements and a number of benefits, like:

- 5 - to achieve a higher degree of functionality -from RAT to RAT/AR - of the ordinary radio access terminals more easily;
- operators do not need to make reference to very expensive and detailed high-resolution maps in order to plan their network;
- possible unreliable coverage predictions can be corrected through RAT/AR
- 10 devices;
- future proof system deployment, even in case new buildings are erected;
- the line-of-sight problem can be considered as solved to a percentage very close to 100%;
- operators may increase their business, since virtually all customers are
- 15 reachable;
- operators will avoid promotion and negotiation activity with unreachable customers and/or any image drop when contracts already signed cannot be respected, thus increasing the system marketing value.

It is understood that other embodiments and/or modifications of the add-on

20 radio repeater (RAT/AR) are possible, still in the scope of the present invention.

CLAIMS

1. Add-on radio repeater (RAT/AR) for TDMA point-multipoint radio communication systems, characterised in that it consists of an ordinary radio access terminal (RAT), to which the functionality of a repeater is given upon request.

2. Add-on radio repeater (RAT/AR) as claimed in claim 1., wherein the functionality of a repeater is given to the said ordinary, pre-existing and pre-installed radio access terminal by means of adding an external unit, comprising a new antenna and suitable co-ordination means.

3. Repeater as claimed in claim 2., wherein the said external unit does not affect the radio access terminal (RAT) and can be removed at any time.

AMENDED CLAIMS

[received by the International Bureau on 01 December 2000 (01.12.00);
original claim 1 amended; remaining claims unchanged (1 page)]

1. Add-on radio repeater (RAT/AR) for TDMA point-multipoint radio communication systems for fixed services (FS) and fixed wireless access
5 applications (FWAA), characterised in that it consists of an ordinary radio access terminal (RAT), to which the functionality of a repeater is given upon request.

2. Add-on radio repeater (RAT/AR) as claimed in claim 1., wherein the functionality of a repeater is given to the said ordinary, pre-existing and pre-installed radio access terminal by means of adding an external unit, comprising a
10 new antenna and suitable co-ordination means.

3. Repeater as claimed in claim 2., wherein the said external unit does not affect the radio access terminal (RAT) and can be removed at any time.

- 1/2 -

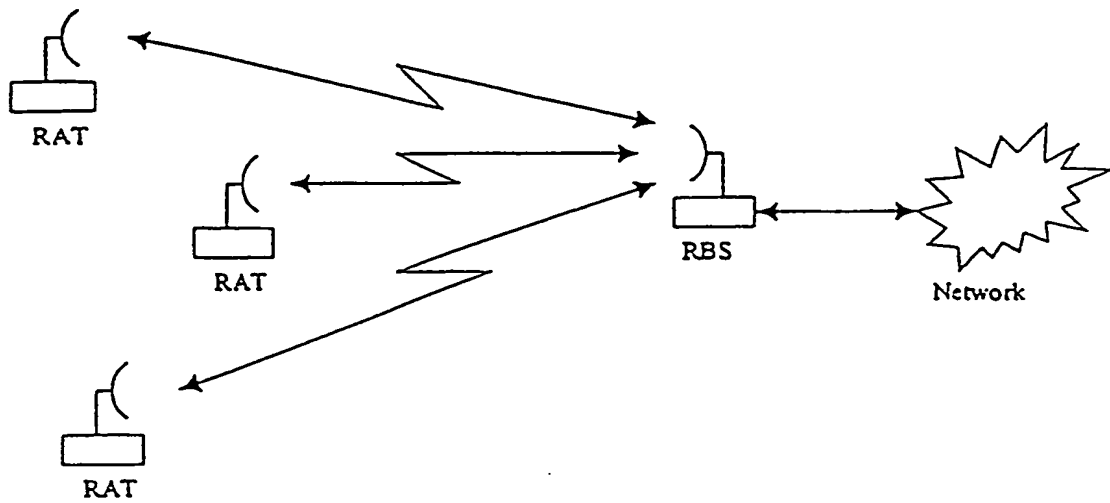


Fig. 1

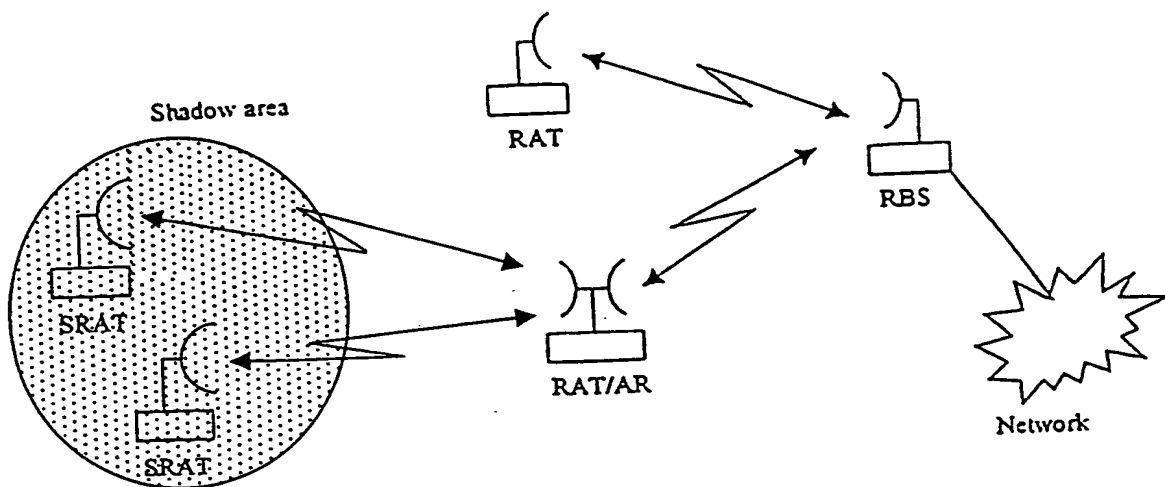


Fig. 2

- 2/2 -

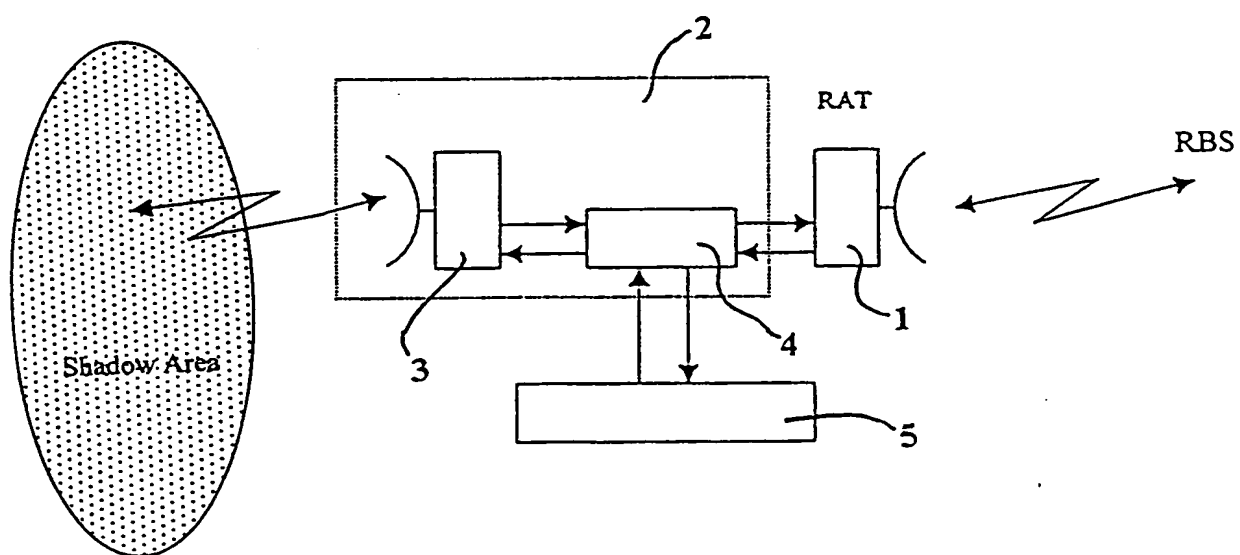


Fig. 3

INTERNATIONAL SEARCH REPORT

Inte. Application No
PCT/IB 00/01088

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B7/26 H04Q7/32 H04Q7/36

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04B H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 195 35 021 A (ARNOLD JOERG DR) 10 July 1997 (1997-07-10) abstract; claims 1-4 column 3, line 39 -column 4, line 7 ---	1-3
X	US 5 850 593 A (URATANI CHIKARA) 15 December 1998 (1998-12-15) column 2, line 60 -column 4, line 18; claim 6; figures 1-3 abstract ---	1
X	DE 33 37 648 A (LICENTIA GMBH) 26 February 1987 (1987-02-26) abstract page 2, line 1 - line 10 page 3, line 9-11 page 3, line 58 - line 65; figures 1,2 --- -/-	1

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

11 September 2000

Date of mailing of the international search report

04/10/2000

Name and mailing address of the ISA

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Staeger, R

INTERNATIONAL SEARCH REPORT

Inte. Application No
PCT/IB 00/01088

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 689 303 A (ALCATEL BELL SDT SA) 27 December 1995 (1995-12-27) abstract; figure 1 -----	1
X	DE 196 42 515 A (BOSCH GMBH ROBERT) 16 April 1998 (1998-04-16) abstract; figures 1,2,4 column 3, line 64 -column 4, line 24 -----	1
X	EP 0 778 679 A (R & S BICK MOBILFUNK GMBH) 11 June 1997 (1997-06-11) column 2, line 57 -column 3, line 23; claims 1,5; figure 1 -----	1-3

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. Patent Application No

PCT/IB 00/01088

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 19535021 A	10-07-1997	NONE	
US 5850593 A	15-12-1998	CN 1126415 A GB 2291564 A,B JP 8084373 A SG 32405 A	10-07-1996 24-01-1996 26-03-1996 13-08-1996
DE 3337648 A	26-02-1987	NONE	
EP 0689303 A	27-12-1995	NONE	
DE 19642515 A	16-04-1998	CZ 9901280 A WO 9817073 A EP 0932992 A PL 332605 A	15-09-1999 23-04-1998 04-08-1999 27-09-1999
EP 0778679 A	11-06-1997	DE 19542390 A	15-05-1997

CLAIMS

1. Add-on radio repeater (RAT/AR) for TDMA point-multipoint radio communication systems, characterised in that it consists of an ordinary radio access terminal (RAT), to which the functionality of a repeater is given upon request.

2. Add-on radio repeater (RAT/AR) as claimed in claim 1., wherein the functionality of a repeater is given to the said ordinary, pre-existing and pre-installed radio access terminal by means of adding an external unit, comprising a new antenna and suitable co-ordination means.

3. Repeater as claimed in claim 2., wherein the said external unit does not affect the radio access terminal (RAT) and can be removed at any time.

AMENDED CLAIMS

[received by the International Bureau on 01 December 2000 (01.12.00);
original claim 1 amended; remaining claims unchanged (1 page)]

1. Add-on radio repeater (RAT/AR) for TDMA point-multipoint radio
communication systems for fixed services (FS) and fixed wireless access
5 applications (FWAA), characterised in that it consists of an ordinary radio access
terminal (RAT), to which the functionality of a repeater is given upon request.

2. Add-on radio repeater (RAT/AR) as claimed in claim 1., wherein the
functionality of a repeater is given to the said ordinary, pre-existing and pre-
installed radio access terminal by means of adding an external unit, comprising a
10 new antenna and suitable co-ordination means.

3. Repeater as claimed in claim 2., wherein the said external unit does not
affect the radio access terminal (RAT) and can be removed at any time.

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REC'D 12 NOV 2001

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)


Applicant's or agent's file reference PV/38720/PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IB00/01088	International filing date (day/month/year) 03/08/2000	Priority date (day/month/year) 19/08/1999
International Patent Classification (IPC) or national classification and IPC H04B7/26		
Applicant TELEFONAKTIEBOLAGET LM ERICSSON et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 8 sheets, including this cover sheet.
 - ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of ¹ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 16/03/2001	Date of completion of this report 07.11.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Staeger, R Telephone No. +49 89 2399 8124



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IB00/01088

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-4 as originally filed

Claims, No.:

1-3 as received on 16/03/2001 with letter of 01/12/2000

Drawings, sheets:

1/2,2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IB00/01088

☐ the drawings, sheets:

5. ☒ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

see separate sheet

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2-3
	No:	Claims	1
Inventive step (IS)	Yes:	Claims	
	No:	Claims	2-3
Industrial applicability (IA)	Yes:	Claims	1-3
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

I.5 Amendments

The applicants did not indicate a basis for the amendments as introduced by the applicants according to Article 19 PCT. Moreover, the examiner could neither find the introduced expressions "fixed services" or "fixed wireless access applications" nor parts of these expressions in the application as originally filed. Therefore, according to Article 19 (2) PCT the following statement with regard to novelty and inventive step will be indicated without taking into account these amendments. Even if there would be a basis for these amendments, the introduced expressions are considered as unclear, because they are not selfexplaining with regard to the scope of the services and applications and thereby lead to an unclear scope of claim 1.

V. Reasoned statement with regard to novelty and inventive step:

0. The following documents (D) are referred to in this communication; the numbering will be adhered to in the rest of the procedure:

D1 = DE-A-195 35 021

D2 = US-A-5 850 593

D3 = DE-A-333 7648

D4 = EP-A-689 303

D5 = DE-A-196 42 515

D6 = EP-A-778 679

1. Pre-remark to the use of the wording "for" (e.g. in claim 1) could be helpful for the further examination process. According to PCT-Guidelines C-III, 4.8 the wording "for" is read as "suitable for" and is therefore not necessarily limiting to the features following the wording "for".
- 2a. Claim 1 is formulated in such a general manner that the features of said claim can be read from a lot of documents, for instance from D1. In the following references to D1 will be indicated in brackets.

Document D1, in particular abstract, claims 1-4, col. 3, l. 39 to col. 4, l. 7 discloses as in claim 1:

Add-on repeater (relay) for TDMA (col. 3, l. 57) point-multipoint radio communication systems for fixed services and fixed wireless access , characterized in that it consists of an ordinary radio access terminal, to which the functionality of a repeater is given upon request (cl. 1, col. 3, l. 42).

- b. Furthermore, it is possible to give for claim 1 an equivalent objection based on document D2.

Document D2, in particular abstract, figures 1-3; col. 2, l. 60 to col. 4, l. 18 and claim 6 discloses as in claim 1:

Add-on repeater for TDMA (abstract) point-multipoint radio communication systems (fig. 1), characterized in that it consists of an ordinary radio access terminal (15(1)), to which the functionality of a repeater is given upon request (used as repeater when requested according to the results of the judging circuit, col. 4, l. 8-18).

- c. Furthermore, claim 1 seems to have a lack of novelty with regard to D3 (abstract, p. 2, l. 1-10; figs. 1-2; p. 3, l. 9-11, l. 58-65) and D4 (abstract, figure 1).

Therefore, the subject-matter of independent claims 1 cannot be considered as novel (Article 33(2) PCT).

- d. Moreover, it is noted that even if novelty could be argued based on minor differences, between claim 1 and D1 or D2 or D3 or D4 it appears that such differences would not involve an inventive step (Article 33(3) PCT), when having in mind the knowledge of the skilled person in the field of radio communication.

3. Moreover, an inventive step objection can be raised against claim 1 on the basis of D5 (abstract, figs. 1, 2, 4; col. 3, l. 64 to col. 4, l. 24) or D6 (**figure**, col. 2, l. 57 to col. 3, l. 23, claim 1 and **claim 5**. In this context it is considered that D6 is not limited to repeat only synchronisation information, see claim 5).

Claim 1 of the present application differs mainly from D5 and D6 in the additional feature of TDMA which is not explicitly mentioned in said documents. However, TDMA is an obvious communication mode for the skilled person which the skilled person would take into account as an obvious design option.

Therefore claim 1 does not meet the requirements of Article 33(3) PCT, because claim 1 does not involve an inventive step with regard to D5 and D6.

4. Prima facie dependent claims 2-3 do not contain any features which, in combination with the features of any claim to which they refer, involve an inventive step, for the following reasons:
 - a. **Claim 2:**
 - i. Feature "external unit": See D1, col. 3, l. 61 to col. 4, l. 3; claims 2-4 or see D6, col. 2, l. 57 to col. 3, l. 2.
 - ii. "suitable co-ordination means" are considered as any means in D1 performing any co-ordination or controlling.
 - iii. The difference of an antenna at the external unit is considered as an obvious design option, because most repeaters (here added external unit) have an additional antenna. See also D5 figure 1, feature 5.
 - b. **Claim 3:**
 - i. See D1, claim 3, radio connection can be removed at any time.
 - ii. The unclear additional feature "said external unit does not affect the radio access terminal" (see section 5c. below) is also implied in D1. Moreover said feature is an obvious result which is often intended to be achieved when units are added to an existing radio communication system.
 - c. Objections to a possible combination of claims 1-3 can also be raised on the basis of D2-D5.
 - i. The main additional feature of claims 2-3 "using an **external unit** for adding the functionality of a repeater" is considered as only one of two obvious design options of using either an external unit or an internal unit. The skilled person would take this limited number of design options into account. Therefore also a combination of claim 1 with claims 2 and/or 3 would not be inventive with regard to

D2-D5 and the knowledge of the skilled person.

- ii. Furthermore, this feature of an external unit has already been employed for the same purpose in a similar device, see document D1, col. 3, line 61 to col. 4, l. 3 or in D6, claims 2-4. It would be obvious to the person skilled in the art, namely when the same result is to be achieved, to apply these features with corresponding effect to the features of any one of the documents D2-D5 and would thereby arrive at the main features of a combination of claims 1 and 2.

Therefore also the combination of the features claims 1-3 would prima facie not involve an inventive step (Article 33(3) PCT).

It is not at present apparent which part of the application could serve as a basis for a new, allowable independent claim. Should the applicants nevertheless regard some particular matter as patentable a new independent claim including such matter should be filed.

The applicants **should also indicate** in the letter of reply the difference of the subject-matter of the new claim vis-à-vis the state of the art.

VII. Certain defects in the international application:

1. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the most relevant of documents D1-D6 is not mentioned in the description, nor are these documents identified therein.
2. The applicants should have had indicated the document on which the two-part form of claim 1 is based on.

VIII. Certain observations (Lack of Clarity (Article 6 PCT)):

- a. The wording "**Add-on repeater** ... characterized in that it **consists of** an ordinary radio access terminal (RAT)" leads to an unclear scope of the claim for the following reasons:

- i. Firstly, there is a contradiction between the word "**add-** repeater" which implies adding the repeater to the RAT and the wording "consists of" which implies that the repeater is part of the RAT. However, as can be seen e.g. from claim 2 it is not intended that the repeater is part of the RAT. It is even intended that the repeater is an external unit which can be connected to the RAT.
 - ii. Secondly, the present formulation of claim 1 leads to a lack of clarity, because the repeater for which protection is sought is only defined by its relationship to the RAT and not by feature of the repeater (see PCT, **Guidelines C-III, 4.8a**). This leads to a doubt whether the repeater or a combination of RAT and repeater should be protected.
- b. In claim 1 the wording "the functionality of a repeater is given upon request" is unclear, because in this wording the matter for which protection is sought is not clearly defined. The **functional statement** of said wording does not enable the skilled person to determine which technical features are necessary to perform the stated function (some of these features are in claim 2).
- c. In claim 3 the term "said external unit does not affect the radio access terminal" does not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not defined. The claim attempt to define the subject-matter in terms of the **result to be achieved**. Such a definition is only allowable under the conditions elaborated in the Guidelines C-III, 4.7. In this instance, however, such a formulation is not allowable because it appears possible to define the subject-matter in more concrete terms, viz. in terms of how the effect is to be achieved.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference PV/38720/PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/IB 00/ 01088	International filing date (day/month/year) 03/08/2000	(Earliest) Priority Date (day/month/year) 19/08/1999
Applicant TELEFONAKTIEBOLAGET LM ERICSSON et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of Invention is lacking** (see Box II).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

ADD-ON RADIO REPEATER FOR TDMA POINT-MULTIPOINT RADIO COMMUNICATION SYSTEMS

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

3

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No

IB 00/01088

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H04B7/26 H04Q7/32 H04Q7/36		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 H04B H04Q		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) WPI Data, PAJ		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 195 35 021 A (ARNOLD JOERG DR) 10 July 1997 (1997-07-10) abstract; claims 1-4 column 3, line 39 -column 4, line 7 ---	1-3
X	US 5 850 593 A (URATANI CHIKARA) 15 December 1998 (1998-12-15) column 2, line 60 -column 4, line 18; claim 6; figures 1-3 abstract ---	1
X	DE 33 37 648 A (LICENTIA GMBH) 26 February 1987 (1987-02-26) abstract page 2, line 1 - line 10 page 3, line 9-11 page 3, line 58 - line 65; figures 1,2 --- -/--	1
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family		
Date of the actual completion of the international search 11 September 2000		Date of mailing of the international search report 04/10/2000
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Staeger, R

INTERNATIONAL SEARCH REPORT

International Application No

IB 00/01088

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 689 303 A (ALCATEL BELL SDT SA) 27 December 1995 (1995-12-27) abstract; figure 1 ---	1
X	DE 196 42 515 A (BOSCH GMBH ROBERT) 16 April 1998 (1998-04-16) abstract; figures 1,2,4 column 3, line 64 -column 4, line 24 ---	1
X	EP 0 778 679 A (R & S BICK MOBILFUNK GMBH) 11 June 1997 (1997-06-11) column 2, line 57 -column 3, line 23; claims 1,5; figure 1 -----	1-3

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

IB 00/01088

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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			JP 8084373 A	26-03-1996
			SG 32405 A	13-08-1996
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EP 0689303	A	27-12-1995	NONE	
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			WO 9817073 A	23-04-1998
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